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This application is a divisional application of United States Patent Application No. 09/419,047, filed October 15, 1999, which claims the benefit of United States Provisional Application 60/104,503, filed October 16, 1998.

To the following:

dn This application is a divisional application of United States Patent Application No. 09/419,047, filed October 15, 1999, which claims the benefit of United States Provisional Application 60/104,503, filed October 16, 1998, which issued into Patent No. 6,377,142, issued on April 23, 2002.

Summary of the Invention Amendment

Please amend the summary of the invention to the following which reflects the currently claimed invention (i.e., the Waveguide Embodiment). For ease of review a marked up version is followed by a clean version.

Marked-up Version:

This invention provides a tunable dielectric structure including a first layer of dielectric material, and a second layer of dielectric material positioned adjacent to the first layer of dielectric material, with the second layer of dielectric material having a dielectric constant that is less than the dielectric constant of the first layer of dielectric material. The structure further includes electrodes for applying a controllable voltage across the first dielectric material, thereby controlling a dielectric constant of the first dielectric material, wherein at least one of the electrodes is positioned between the first and second layers of dielectric material.

The dielectric materials can be formed in various shapes and assembled in various orientations with respect to each other. The [L]aminated structures of such dielectric materials herein [can] serve as substrates for [microstrips, coplanar or other planar microwave transmission lines, as well as dielectric media for coaxial cable, or] waveguides.

Clean Version:

23 This invention provides a tunable dielectric structure including a first layer of dielectric material, and a second layer of dielectric material positioned adjacent to the first layer of dielectric material, with the second layer of dielectric material having a dielectric constant that is less than the dielectric constant of the first layer of dielectric material. The structure further includes electrodes for applying a controllable voltage across the first dielectric material, thereby controlling a dielectric constant of the first dielectric material, wherein at least one of the electrodes is positioned between the first and second layers of dielectric material.

The dielectric materials can be formed in various shapes and assembled in various orientations with respect to each other. The laminated structures of such dielectric materials herein serve as substrates for waveguides.

Remarks

Reconsideration of the application is respectfully requested.

Upon entry of the foregoing amendment, claims 1-7 are pending in the application. These changes are believed to introduce no new matter, and their entry is respectfully requested. Based on the above amendment and the following remarks, Applicants respectfully request that the Examiner reconsider all outstanding objections and rejections and that they be withdrawn.

Summary of claim Rejections and discussion

Claims 1 – 7 were rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to point out and claim the subject matter which applicant regards as the invention. In all claims “microstrip”, was replaced with waveguide to more clearly claim the waveguide aspect of the invention.

Claim 3 and 6 the modifier “generally” was objected to making the claim vague and indefinite, in all occurrences “substantially” replaced “generally” to traverse this rejection.

In claim 3, the language, “at least selected ones...” the Examiner believes makes the claim vague and indefinite. The claim was modified with the following language: said additional layers of dielectric material can include at least one layer.

In claim 7, the term “a combination thereof” was deleted.

In claim 1, fourth paragraph “first and second” was placed in front of electrodes.

In Claim 2, “a dielectric constant” was rephrased as “the dielectric constant”

Claims 5 and 7 were placed in proper Markush format.

In claim 6, “of dielectric material” now follows “layers” for consistency of description.

In claim 7, “layer of” now follows “first” for consistency of description.

Regarding the ‘103 rejection of claims 1, 6 and 7, Claim 1, as amended requires a first layer, of a multi-layered stack, of dielectric material;

a second layer, of a multi-layered stack, of dielectric material, having a dielectric constant less than 30, positioned adjacent to said first layer of dielectric material, said second layer of dielectric material having a dielectric constant that is less than the dielectric constant of said first layer of dielectric material;

first and second electrodes for applying a controllable voltage across said first dielectric material, thereby controlling a dielectric constant of said first dielectric material, wherein at least one of said first and second electrodes is positioned between said first and second layers of dielectric material;

a [microstrip] waveguide positioned adjacent to a first edge of each of said first and second layers; and

first and second ground planes positioned on opposite sides of said [microstrip]waveguide.

The present invention, as described in claims 1-7, provides a structure having an overall relatively low dielectric constant, but retaining desirable high tunability and low loss characteristics in the multilayered stack structure..

This configuration is a multi-layer stack of dielectric. This multilayer is not disclosed nor claimed in Barnes. This stack is what will give the coplanar line its superior properties. Further, Barnes is very specific in his configuration not only is it NOT a multilayer, it is only thin film BST. All the materials in the Paratek invention herein are combinations of materials as opposed to Barnes.

Thus, Barnes discloses a phased array antenna for microwave and millimeter wave applications, using either microstrip line, coplanar waveguide, or other construction techniques incorporating a solid dielectric transmission line. He uses continuously

variable phase delay structure which is used to control the beam pattern of the phased array antenna which can be applied to the construction of resonant frequency tunable coplanar waveguide antennas and impedance tunable quarter-wave transformers. In Barnes, the propagation constant of the transmission line is directly proportional to the square root of the effective dielectric constant (assuming a lossless dielectric) and thus an array of multiple antenna elements provided can feed the structure using the disclosed transmission lines and the direction of the resultant main beam of the array can be made to vary over a complete half-sphere.

Consequently, as mentioned above, Barnes neither discloses nor suggests that the stacked layer of dielectric material and that it could be greater than 100 and less than 30 respectively. Barnes does provide for a phased array antenna for microwave and millimeter wave applications and discloses differing dielectric constants, but the material and positioning of the layers would not enable a structure that has an overall relatively low dielectric constant, but retains desirable high tunability and low loss characteristics in the manner of the present invention.

As claims 6 and 7 depend on claim1, with the considerations above, the rejection is traversed.

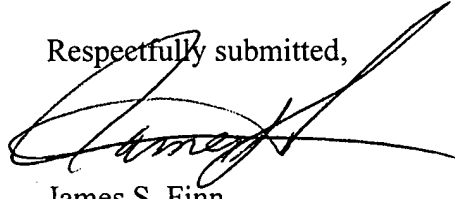
Conclusion

All of the stated grounds of objection and rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicants believe that a full and complete reply has been made to the

outstanding office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reasons, that personal communication will expedite prosecution of this application the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment and Reply is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'James S. Finn', written over the typed name.

James S. Finn
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Date: 2-19-03

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